

Cave Swallows  
Study Proposal/Field Protocol

**Proposal for Cave Swallow Study**

**Background**

There are approximately 800 bird species that occur in the United States (American Ornithological Union [AOU] Checklist 1983). Many species are well known and have been the subject of numerous research projects. Generally, species are well known if they are game species, on the threatened or endangered list or ones that are considered to be culturally important. Some species occur peripherally in North America and most of these are also well known.

As a group, swallows are popular in folklore and scientific literature. There are 74 species found in the Family Hirundinidae, Order Passeriformes (Turner and Rose 1989). Eight species of swallows regularly breed in the United States, seven widely nest in the lower 48 states with 6 extending their breeding range as far as Alaska (AOU Checklist 1983). The cave swallow (*Petrochelidon fulva*), unlike most swallows, has a limited area of distribution. No other swallow in the United States has a smaller range than the cave swallow.

There are three recognized subspecies of cave swallows (Howard and Moore 1980). The nominate form, *Petrochelidon fulva fulva* is found in the Greater Antilles and extreme southeast Florida. *Petrochelidon fulva citata* is a resident population which occurs in the Yucatan Peninsula of Mexico and the third and largest subspecies, *Petrochelidon fulva pallida*, occurs in northeastern Mexico, the southern half of Texas and southern New Mexico (West 1995).

There are also records of vagrants along the East Coast of the United States with many of the birds being assisted by hurricanes (West 1995). A small population once occurred on the University of Arizona campus in Tucson, Arizona, but has since died out (Davis and Russell 1990). A very small population has recently spread into extreme southwestern Louisiana (Cardiff 1997).

Cave swallows are neotropical migrants. Neotropical migrants nest in the United States, but depart for southern latitudes once the nesting season is over. Therefore, the majority of the year is spent south of the United States. This is not true of all cave swallows, as some are known to remain most of the year north of Mexico. Cave swallows are in the *most threatened* category of neotropical migrants (Mehlman and Williams 1995).

In March 1890 (Scott 1890), cave swallows were first collected in the United States as vagrants at the Dry Tortugas in Florida. The species was recorded throughout much of the present century in part of Florida and finally resulted in the establishment of a small breeding population in south Miami, Dade County in 1987 (Smith *et al.* 1988). This

population will probably extend slowly northward in a similar colonization pattern that has been noted in the Southwest (Robertson and Woolfenden 1992).

In 1910, individuals of the *pallida* subspecies were first recorded in Texas (Bishop 1910) and the first nesting record reported in 1914 (Thayer 1914). This species is believed to have arrived in New Mexico prior to 1930 (Johnson 1960). Birds were originally collected at Ogle Cave in Slaughter Canyon in what is now Carlsbad Caverns National Park and were identified as the phenotypically similar cliff swallow (*Petrochelidon pyrrhonota*). The species was rediscovered at Goat Cave, also in Slaughter Canyon, in June 1952 (Kincaid and Prasil 1956). Ligon (1961) recorded the species and 200 individuals at four Slaughter Canyon sites. During the summer of 1966, cave swallows were observed at the entrance of Carlsbad Cavern (West 1991).

Between 1966 and 1998, the Carlsbad Cavern population expanded from six to about 2500 birds (West 1991). The most recent survey of all known historic and current sites occurred in 1991. In this survey, cave swallows were found at 20 sites in the Guadalupe Mountains. At two of the sites, there was no current activity, but the birds had nested there in the recent past. The total population was estimated at about 4720 to 5220 individuals, and it is estimated that half of all cave swallows in New Mexico (2500 to 3000) use Carlsbad Cavern as their primary nesting and roosting site.

The spread of cave swallows to Carlsbad Cavern was a natural event duplicated elsewhere along the northern edge of the range for the species. Movement to Carlsbad Cavern may have been aided to some degree by the availability of water, mud and nesting materials. However, at this late date, it cannot be measured. Otherwise, few habitat modifications are noted which might have promoted this range expansion. Currently, Carlsbad Cavern may be the easiest place to view this species in the United States. Bird watchers and photographers regularly visit the cave solely for the purpose of viewing and photographing the cave swallows (Grover 1979).

### **Banding and Monitoring Project**

In 1978, West (1991) began work on cave swallows in the Glass Mountains, Brewster County, Texas. He moved to Carlsbad in the fall of 1978 and began conducting cave swallow studies at Carlsbad Cavern. In 1980, banding began at Carlsbad Cavern and this activity continues today. Since 1980, more than 12,000 individuals have been netted and banded and 11,000 retraps have occurred, many involving multiple encounters. Each of over 400 banding trips to Carlsbad Cavern has resulted in the netting of from one to 192 birds. Volunteer help has made this project successful. The project has been funded totally from private sources.

### **Methods**

The procedure for securing birds is to stretch a nylon mist net across the entrance area of a cave. The exact net location varies, but the net is usually placed near the point in the cave entrance where the opening squeezes down to its most narrow point. The site regularly used is nine switchbacks down from the metal fence. Because of net size and the ability of the birds to avoid the net, this appears to be the only practical capture site.

Usually only a single net is used, but with an adequate number of students, up to three nets may be in use at a time. Some of the additional nets may serve to funnel birds rather than capture them.

When a bird strikes the net, it forms a pocket in the bottom of one of the net panels. Often the bird escapes before it can be removed from the net, but most become further entangled. Feathers, feet and the band, if the bird already has one, can all serve to hold the bird in place until removal from the net.

Banding operations normally begin about 5 PM, but starting time varies with time of year, weather and bat flights. Two aluminum conduit poles, approximately 3.3m in length, will hold the net in place. One student will hold each pole. Students will place the net across the cave opening and will hold it steady until several birds are captured. A significant number of birds avoid the net because it does not cover the entire entrance and because cave swallows are adept at avoiding nets.

After birds are in the net, the two students holding the poles will lower the net. Students will remove the birds under the supervision of the Principal Investigator. Adjoining swallows in the net will be removed first.

After removing a bird from the net, a student will hold the bird until the Principal Investigator receives the bird for the purpose of banding it and taking measurements. While holding the bird, the student will make observations – Does the bird have an odor? Is there an insect in its mouth? If so which species? Is there speckling on the signature patch? Does the bird have a brood patch? Students should relate any significant observations when handing the bird to the Principal Investigator.

The Principal Investigator bands the new birds (those without a band) on the left leg with a US Fish and Wildlife Service band. During the banding procedure, the Principal Investigator will measure both wings and the tail. The Principal Investigator, or a student under his supervision, will weigh the bird in a plastic sack using a pesoli scale. Students will observe the banding and measurement processes.

During the nesting season (May through August), adult birds will be checked for the presence of a brood patch, the only reliable field indicator to determine sex identity. Birds carrying mud or insects will be recorded as well as feather anomalies or odd plumage patterns, external parasites or anything different from the general population. The age of the bird will be noted; young birds first appear in late June. Plumage and other physical characteristics that enable age determination are present until the birds depart in October. Students will record all data supplied by the Principal Investigator.

After the data is recorded, the Principal Investigator will allow a student to release the bird. The student will release the bird without delay.

This wide-ranging species is colonizing caves in southeastern New Mexico and species success depends on this colonization process. An important element in the colonization

process is communication. Communication within active, breeding colonies will be the focus of the project. We will monitor vocal interactions between offspring and adults, between males and females and within the total colony to try and assess the dynamics of vocalizations in a colonial species. This will be compared with other studies of a similar colonial swallow, the cliff swallow, *Petrochelidon pyrrhonota*, which also use colonies as information centers (Wittenberger and Hunt 1985).

### **Plan of Study**

The Principal Investigator will provide on-site instruction for a maximum of eight Chihuahuan Desert Lab students on a single banding date. The Principal Investigator may appoint adult facilitators to assist. Prior to handling birds, each student will be trained as to how to handle the birds and collect data. All students will be supervised until they have mastered the ability to handle swallows without harming the subject. It may be necessary for some students to participate in a number of banding field trips, before experiencing the various components of the process.

As in the past, the Principal Investigator will halt banding operations if weather conditions, bat flights, or other conditions preclude the safe handling of birds.

### **Access and Preservation of 1980 – 1998 Data**

There is a great volume of data on the cave swallow colony at Carlsbad Cavern, and smaller amounts of data are available from banding operations conducted at other nearby sites. Currently, approximately 2000 pages of data in 10 binders are stored at two separate locations. Accessing information from these data sheets is unwieldy. Storing information in a retrievable form would provide students opportunities to evaluate population dynamics and historic trends. Other items that might be examined include sex and age ratios, survivability, incidence of parasites, life tables, site use, weight variation and sex breakdown in food selection and nest construction. To determine population variability, an electronic medium is imperative to facilitate data analysis. Students will learn computer skills, database design, data entry and analysis while storing and retrieving current and historical banding data.

### **Continued Banding Studies at Carlsbad Cavern**

Banding operations would continue at Carlsbad Cavern. The primary study site is the current banding location. Students and other volunteers from the southern New Mexico and west Texas area will collect, store and analyze data. Students will assist in the banding process approximately once a week from March through October. Students will learn the importance of collecting and analyzing field data.

### **Food Habit Studies**

During summer, young birds are in the nest and adults carry insects continually until the hatch year birds fledge. Mouths of adults are often full of insects to the degree that many are dropped when they strike the net or are handled. Care will be taken when handling birds carrying insects and we will coax the birds to take back dropped insects.

While not a qualitative study, samples of dropped insects will be collected and identified. Specimens suitable for the park collection will be logged with appropriate data. This will enable students to learn about food sources. Students will assist in collecting specimens, gathering appropriate data and identifying insects.

### **Tape Recordings**

The Principal Investigator will appoint students to operate the vocal recorder. Students who do not operate the tape recorder system will observe the process. The location of the recordings will vary – in front of the cave's gate, past the gate, across the escarpment and above the entrance, as well as the time of the day -- afternoons, late evenings and early mornings. Calls will be compared with calls from other nesting sites, available from outside sources. Recordings will be made using a Marantz portable cassette recorder available through the Chihuahuan Desert Lab. The microphone is hand-held and equipped with a parabolic shield that aids in eliminating extraneous noise. No impact upon the birds is anticipated.

Songs will be plotted on a sonogram, using a computer program available through the CDL. Students will compare vocalizations and analyze differences. An attempt will be made to classify calls according to type.

Any playback of calls in the cave will be under the supervision of the Principal Investigator and may be covered under a separate permit. Recordings will not be done during banding times or during any time that might stress swallow-nesting behavior.

The tapes are the property of the NPS and will not be dispensed to external sources without NPS permission.

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